



# A QUANTITATIVE RESEARCH ON SELF-MANAGEMENT OF TYPE 2 DIABETES IN MIDDLE-AGED POPULATION OF RURAL AREA OF PAKISTAN

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## ABSTRACT

**Background:** In Pakistan, the prevalence of Type 2 diabetes is high ranging from 7.6 % (5.2 million populations) to 11 % as compared to the prevalence rate of 8.3% in the world. The high prevalence of type 2 diabetes in the country has been attributed to high-risk factors such as lack of physical activity, unhealthy food and eating habits among the Pakistani population. **Aims:** The main aim of this study is to use the quantitative method to explore the association between illness and cultural beliefs, family and healthcare provider support and self-management behaviours of patients of type 2 diabetes in middle-aged population of Pakistan. **Materials and Methods:** The study will employ quantitative design method to allow for a more comprehensive approach to address a multifaceted problem. The quantitative design will use self-administered survey questionnaires to be provided to n=200 randomly selected patients from the Medical Centre of rural area of Abbottabad, Pakistan to acquire the basic knowledge about diabetes and to measure the association between illness and cultural beliefs and self-management behaviours in that population. **Results:** The quantitative study will acquire demographic information and the basic knowledge about diabetes, illness beliefs, family and social support and self-management activities in the middle-aged population of Pakistan. **Conclusion:** This study will help to improve the diabetes self-management approach in middle-aged population in rural area of Pakistan and will help to better understand the contextual determinants of behaviours for future development of culturally appropriate interventions to modify the illness beliefs and support of self-management activities.

**KEYWORDS:** Type 2 diabetes, quantitative method, middle-aged population, self-management.

## INTRODUCTION

Diabetes mellitus is a pandemic disease and one of the leading threats to human health [1]. The 2014 estimates by the International Diabetes Federation (IDF) showed that there are a total of 371 million people suffering from diabetes in the world, with China (92.3 million), India (63 million) and the United States (24.1 million) leading the way [2]. The estimates also showed that the disease accounted for approximately 4.8 million deaths. According to International Diabetes Federation [2], 4 out of 5 people with diabetes live in low and middle-income countries.

Type 2 diabetes is more prevalent among people aged between 40 and 59 years. The prevalence of type 2 diabetes is higher in Pakistan compared to Australia due to the sedentary lifestyle, obesity and other risk factors in the country [2]. The prevalence of lifestyle risk factors is 26.5% among the males aged 50–59 years and 35% among females with the same age group [3]. The main modifiable behavioural risk factors are tobacco use, unhealthy diet, and physical inactivity [4]. The main biological risk factors are overweight, obesity, high blood pressure, elevated blood glucose [4].

Economically, Whiting et al. [3] reported that more than 471 billion US dollars have been spent on diabetes healthcare globally. Pakistan is one of the developing countries where the health and economic impacts of diabetes have been felt. Whiting et al. [3] estimated that the prevalence rate of the disease in Pakistan is 7.6–11% and the prevalence rate in Australia is 9.55% [3].

In the local context, it has been estimated that in 2030, the prevalence rate in Pakistan will increase to 15% (13.8 million populations) [4]. Therefore, Pakistan is ranked 7th on diabetes prevalence list [5]. Additionally, Pakistan is among the top 10 countries in the world for people with diabetes aged 20–79 years [3]. Type 2 diabetes mellitus is, therefore, a major public health concern affecting the middle-aged population. This is because the middle-aged population in the country is overweight and obese. In addition, the population does not participate in an active physical activity and have unhealthy eating habits. This exposes the population to a high risk of type 2 diabetes [5, 6]. It was reported by Jafar et al. [5] that in a large population-based sample prevalence of overweight was 25% and obesity was 10% [5, 6].

In addition to the sedentary lifestyles and unhealthy eating habits, the region of Pakistan has a population with many social and health disparities contributing to the high rates of diabetes and obesity. The country has been reported to have a high rates of poverty, lack of medical reimbursement and insufficient allocation of health budget, low level of education, high unemployment, an ageing population and limited access to healthcare [7,8]. Moreover, the healthcare system of Pakistan has been confronted with problems of inequity, scarcity of resources, inefficient and untrained human resources, gender insensitivity and structural mismanagement [7, 8, 9].

In response to the precarious health status of the people and poor indicators of health in the region, the government launched the health care reforms in 2001 to help alleviate the growing problem in the health sector. However, the government of Pakistan spends about 0.8% of GDP on health care, which is lower than some neighboring countries such as Bangladesh (1.2%) and Sri Lanka (1.4%) [10]. Although the government provides funding for diabetes as part of the general health system budget, diabetes itself receives an insignificant share of the fund. Additionally, specific funding through private and international collaborators is very limited. Moreover, there is no framework for diabetes monitoring and surveillance [10].

## Self-management approach in global context

The current literature reveals that diabetes self-management is the cornerstone of diabetes care [11]. There are several studies [12,13] that have reported that diabetes self-management is associated with improved diabetes knowledge, self-management behaviours and clinical outcomes. However, in a meta-analysis of diabetes self-management programmes, Norris et al. [13] reported sharp declines in benefits within one month-post intervention suggesting that self-management interventions alone do not enable individuals to maintain behaviour changes. Therefore, it is evident that the behaviour changes after the implementation of self-management programmes require the co-existence of several factors. Fisher et al. [14] suggested that the quality clinical care and self-management are compatible and dependent on each. Therefore, in the absence of sound care, individual's efforts may be misdirected, and expert clinical care will fall far short of its potential.

In diabetes management, patients may fail to use prescribed medications to control the blood sugar or to implement the management plans [14]. One of the factors that are critical for the maintenance of the behaviour changes is the availability of the required resources [14]. Therefore, there is a need for all the required resources to be integrated in order to achieve the benefits associated with self-management. Wagner et al. [15] provided a framework for integrating the resources and supports for self-management with key components of clinical care in a chronic care model.

A number of studies have also suggested that patient understanding and beliefs about health and illness may be shaped by historical and local contexts [16], whether respondents are thinking about health or behaviours in general or about their own [17] and personal experience and observation. Internationally, the leading work in the field of diabetes self-management by the American Association of Diabetes Educators (AADE) has resulted in the identification of seven principle self-care behaviours. These include healthy eating, being active, monitoring, taking medication, problem-solving, healthy coping and reducing risks [18, 19]. These behaviours have recently been endorsed by the equivalent Australian organization, the Australian Diabetes Educators Association.

In Australia, Diabetes - MILES (Management and Impact for Long-term Empowerment and Success) study has been established as an international collaborative, involving a series of national surveys and cohort studies among people with diabetes in various countries [20]. The general aim and concept of that study would provide greater insights for the current study into how people manage their diabetes and how it impacts on their lives. Some important measures or variables included in Diabetes-MILES, Australia include psychological and emotional well-being, diabetes-specific quality of life, healthcare and self-management, family support, depression, self-management behaviour, physical activity and medication adherence [21].

In this current study, some of the Diabetes - MILES study variables (Physical activity, family support, illness beliefs and self-management) have been addressed for the middle-aged population of Pakistan in relation to the self-management of their diabetes. In addition, Diabetes MILES study enables detailed investigation of the psychosocial aspects of living with diabetes and an opportunity to put these findings in an international context [21].

### Self-management approach in local context

Despite the high prevalence of diabetes and serious long-term complications, there is still lack of understanding and establishing the evidence-based guidelines for self-management [12] and translation of practice recommendations to care in Asian countries [22] and in developed countries [23]. Most of the healthcare facilities in Pakistan have not met the evidence-based quality of care standards established by the American Diabetes Association [24]. Therefore, the facilities face special challenges in providing diabetes care to the poor patients in the country.

There is a lack of information among diabetes patients in Pakistan. For instance, Ali, Khalid and Pirkanj[25] investigated diabetes knowledge, beliefs and practices among people with diabetes and provided evidence that there was a lack of information available to people with diabetes in Pakistan. The study established that a large number of the diabetes population in Pakistan has never received any diabetes education [25]. Therefore, the findings of this study show that there was a poor patient education in urban areas indicating a poorer diabetes perception and practice in the rural areas as well. The other studies [26–32] carried out in Pakistan on diabetes education, and awareness reported a low diabetes awareness at the physicians, patients and community levels.

This research will address the middle-aged population of Pakistan with diabetes aged between 40-60 years. This is because the highest age-specific prevalence of diabetes in Pakistan and in line with the latest estimates of International Diabetes Federation on the greatest number of people with diabetes is between 40-59 years [3]. In addition, keeping in view the high prevalence of diabetes and serious long-term complications, promoting an active lifestyle or regular exercise has become the highest public health priority in Pakistan. In this context, this project is significant in addressing the prevalence and the serious long-term complications associated with type 2 diabetes.

### The Conceptual Framework for the Study

The model presented in Figure 1 provides a conceptual framework of self-management of type 2 diabetes. The model explores the relationships between the variables that influence the self-management of type 2 diabetes among the middle-aged population of Pakistan. The literature review informed that these variables can be grouped together into five categories: socio-demographic characteristics, behavioural and psychological characteristics, social support, cultural characteristics and barriers to self-management. These categories are identified in the conceptual framework as related factors that may influence self-management of type 2 diabetes among the middle-aged population of Pakistan.

There is evidence that higher levels of social support are related to better long-term self-management and better health outcomes [33, 34]. There is also a significant association between support and health. Support can be assessed from a variety of sources, including family, spouses, family, neighbours and friends[35]. The relationships between support and immunity [36], health status and health behaviours [37], mortality and quality of life [38, 39] have also been reported in the literature. King et al. [40] have demonstrated that self-efficacy, problem solving, and social environment support are associated with diabetes self-management behaviours.

### Aims and Objectives

The primary aim of this study is to use the quantitative method to explore the association between illness and cultural beliefs, family and healthcare provider support and self-management behaviours in middle-aged population of Pakistan. Embedded in this exploration are a number of distinct objectives:

1. To explore how the health issue related to diabetes is viewed and addressed individually and within the rural communities in Pakistan.
2. To explore the factors affecting the self-management practices among the study population.
3. To examine how health professionals perceive the self-management approach of the patients and their specific behaviours

### Research Questions

The research questions have been formulated as follows:-

1. What are the patients' perception and experiences of diabetes self-management in a rural area of Pakistan?
2. What factors affect the diabetes self-management practices?
3. Does socio-demographic influence the diabetes self-management?
4. What social and religious beliefs influence the experience and practice of diabetes self-management?

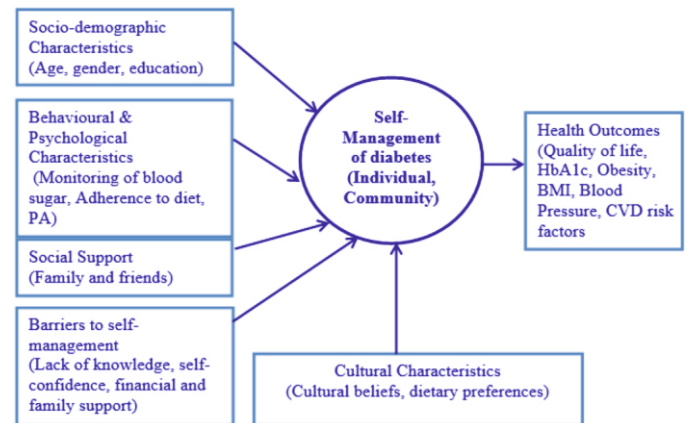


Figure 1: Conceptual framework of self-management of type 2 diabetes

### MATERIALS AND METHODS

#### Quantitative Design

The quantitative design approach will use self-administered survey questionnaires to acquire demographic information and the basic knowledge about diabetes, measuring illness beliefs, family and social support and self-management behaviours in the middle-aged population of Pakistan. The data collected on these issues will be analysed by means of statistical analysis.

#### Sampling Method

The study will employ quantitative methods to conduct interviews of n=200 diabetic patients randomly selected representing the larger sample from three diabetic centers in rural area of Abbottabad, Pakistan. The study sample will be restricted to the patients enrolled in the Primary Health Care Centres.

#### Participant Recruitment

The patients will be recruited from the Primary Health Care (medical centres) in rural area of Abbottabad, Pakistan conducting the study of management of type 2 diabetes among the population aged 40-60 years. The eligibility of patients will be subjected to further screening if their records will not be found in the clinic database. The patients with diabetes having HbA1c >7.0% will be included in this study and patients having coexisting liver, kidney or thyroid disorder will be excluded from this study. The American Diabetes Association (ADA) criteria will be used in the selection of the patients with diabetes [24]. The systematic review of literature has guided the development of the questionnaires and study design for quantitative research provided in Table 1 and Table 2.

#### Description of Data Collection Strategy

##### Patients with Type 2 Diabetes

In this quantitative approach, self-administered survey questionnaires will be provided to 200 randomly selected patients representing the larger sample from three diabetic centers in rural area of Abbottabad to acquire demographic information and the basic knowledge about diabetes and to measure illness beliefs, family support and provider support and to measure the self-management activities of the patients with diabetes. The data collected on these issues will be analyzed by means of statistical analysis.

#### Quantitative Analysis

The quantitative design approach in this study is based on self-administered survey questionnaires which will be administered to acquire demographic information and the basic knowledge about diabetes, diabetes family support, assess the support from the service providers, assess the illness perceptions and measure the self-management activities in the middle-aged population of Pakistan. The data collected on these issues will be analysed by means of statistical analysis using STATA software.

### RESULTS AND DISCUSSION

#### Diabetes Self-Care Activities (SDSCA)

The revised version of the Summary of Diabetes Self-care Activities (SDSCA) suggested by Toobert et al. [41] will be used to measure self-management activities of diabetic patients. The SDSCA measure is a brief self-report questionnaire of diabetes self-management that includes items assessing the aspects of the dia-

betes regimen: general and specific diet, physical activity, adherence to medications and blood glucose monitoring. Each item will be measured using a Likert scale ranging from zero days to seven days.

The strengths of the 11 core items of the revised SDSCA include their brevity and ease of scoring, which make them practical to use both clinically and in research. Their use in previous studies provided valuable information on norms, reliability, and validity, against which new data was evaluated [41]. Diabetes – MILES used an 11-component scale which assesses the frequency of undertaking diabetes self-care activities, the extent to which respondents regard these activities as burdensome and as important [20, 21]. The SDSCA will be translated in the local language Urdu which is widely spoken in that area as majority of population in rural areas do not speak and understand English language.

#### Brief Illness Perceptions Questionnaire (BIPQ)

The 9-item Brief Illness Perceptions Questionnaire (BIPQ) will be used to measure illness beliefs [42]. In this measure, five items assess cognitive representations (consequences, timeline, personal control, treatment control, and identity); two items assess emotional representations and one item assesses illness understanding. Responses will be obtained on a zero to ten point Likert scale. The final item (not reported here) invites free-text responses about what respondents believe caused their condition. The BIPQ has good internal reliability and has been used with a variety of illness groups [43]. In Diabetes-MILES Study, the BIPQ was modified to be diabetes-specific, e.g. questions refer to “your diabetes” rather than “your illness” [21].

#### Resources and Support for Self-management (RSSM)

This will be measured using the seven-item Resources and Supports for Self-Management Short Form (RSSM) scale [44]. A diabetes health care team is defined as all the health care professionals who help to take care of the respondent's diabetes. In this study, the healthcare professionals will include general practitioners and nurses and will exclude friends and families.

#### Diabetes Family Support and Conflict

The Diabetes Family Support and Conflict (DFSC) scale will be used to measure the extent to which participants will share their experiences of having support or conflict related to their diabetes within their families. This measure is similar to the measure used in Diabetes-MILES studies [45]. The scale includes 10 items which address various aspects of diabetes management (including 'taking medications', 'eating well' and 'exercising regularly'). For each item, participants will be asked to indicate the extent to which their family is supportive or is in conflict. Each item is scored on a 1 (never) to 5 (always) scale.

#### Statistical Analysis and sample size calculation

Statistical analyses will be performed using the Statistical package STATA software. The sample size is powered at 80% with alpha, the significance level = 5% or 0.05 and sample size was calculated to detect a standardized difference of 0.38

with 80% power. The following formulas are used to calculate the sample size based on the proportions of population in each group of type 2 diabetic patients for this quantitative study. The calculation of a standardized difference between the two populations, using the nomogram will inform us how many patients are needed [46].

#### Calculations

$p_1$  = proportions of the diabetic patients with poorly controlled diabetes (HbA1c >7%)  
= 17% or 0.17 [26-32].

$p_2$  = proportions of the diabetic patients with controlled diabetes (HbA1c < 7%)  
= 5% or 0.05 [26-32].

$$P = \frac{p_1 + p_2}{2} = \frac{0.17 + 0.05}{2} = 0.11$$

$$\text{Standardized Difference} = \frac{p_1 - p_2}{\sqrt{P(1-P)}} = \frac{0.17 - 0.05}{\sqrt{0.11(1-0.11)}} = \frac{0.12}{0.312} = 0.38$$

Standardized Difference = 0.38

The standardized difference of 0.38, with power at 0.8 and alpha = 0.05 (significance level), we need N=200 type 2 diabetic patients in this quantitative study [46].

Descriptive statistics will be used to obtain measures of central tendency (mean, medians and mode) and dispersion (range, variance and standard deviation) for continuous variables and frequency distribution for the categorical variables. Depending on the research question, differences between subgroups (e.g. men versus women) will be tested using chi-squared tests for categorical data, and independent samples t-tests/analyses of variance for continuous variables. Multiple linear (continuous dependent variable) and logistic (binomial dependent variable) regression analyses will be used to study the association between the independent and dependent variables of interest.

**Table 1: Recruitment and data collection overview for quantitative study**

Participant group		n	Recruitment	Data
Group	Patients with type 2 diabetes	200	Randomly selected from three diabetic centres of rural areas of Abbottabad	Quantitative Study: Self-administered survey questionnaires

**Table 2: General Overview of the Study Designs for Quantitative Research**

Design	Concept	Measure	Sample Size (n) location
Quantitative Research	Diabetes self-care activities	SDSCA – a brief self-report questionnaire of diabetes self-management assessing the aspects of the diabetes regimen [41] (SDSCA – To be translated into local language)	n=200 patients with type 2 diabetes.  Randomly selected from a larger sample representing the three medical centres of rural areas of Abbottabad.
	Beliefs about illness	The 9-item Brief Illness Perceptions Questionnaire (BIPQ) will be used to measure illness beliefs [42, 43]. (BIPQ - To be translated into local language)	
	Healthcare and self-management	Resources and Support for self-management of type 2 diabetes (RSSM) - a seven item short form scale [44]. (RSSM – To be translated into local language)	
	Diabetes Family support	DFSC – Diabetes Family Support and Conflict scale will be used to measure the extent to which the patients will share their experiences of having support or conflict related to self-management [45]. (DFSC – To be translated into local language)	

#### CONCLUSION

The quantitative study will help to acquire demographic information and the basic knowledge about diabetes, illness beliefs, family and social support and self-management activities in the middle-aged population of Pakistan. The quantitative study will measure the association between illness and cultural beliefs, family and healthcare professional's support and self-management behaviours in middle-aged population of Pakistan. It is also anticipated that this study will help to better understand the contextual determinants of behaviours which could facilitate in future the development of culturally appropriate interventions to modify the illness beliefs and support the self-management activities.

#### Conflict of interest

The authors declare that they have no funding resources or conflict of interest to report.

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